ACT Aspire® Scores Associated with PISA Scores: A Preliminary Analysis

Yi Lu, PhD

In 2011, ACT conducted a study that statistically linked ACT Plan to the Programme for International Student Assessment (PISA) 2009 and compared ACT College Readiness Benchmarks to international student performance. Hereafter, this study is referred to as the ACT Plan–PISA 2009 study. After the ACT Plan–PISA 2009 study was conducted, another cycle of PISA was administered in 2012 and, in 2013, the ACT Plan Benchmarks were updated. ACT Aspire, a new product replacing ACT Explore and ACT Plan, measures student growth from grade three through early high school (grades 9 and 10) on a vertical scale. This report updates the linkage between the ACT College Readiness Benchmarks and PISA scales using the updated ACT Plan Benchmarks and presents the ACT College Readiness Benchmarks on the ACT Aspire scale. This preliminary analysis provides a reevaluation of the ACT standards of college readiness to the performance of participating countries/economies from the Organisation for Economic Co-operation and Development (OECD) on the most recent cycle of PISA results.

Why Update the ACT Plan–PISA Link

The ACT Educational Planning and Assessment System (EPAS®) is an integrated series of assessment and career planning programs which includes ACT Explore®, ACT Plan, and the ACT® test. The EPAS assessments are designed to assess students’ academic achievement. In 2005, ACT established the ACT College Readiness Benchmarks to anchor performance on the EPAS to performance in first-year college coursework. In 2013, ACT updated the Benchmarks to adapt to changes in such characteristics as college grading, college student performance, and alignment of course content. Separate Benchmarks were established for ACT Explore, ACT Plan, and the ACT.

Through a concordance study, ACT Aspire early high school assessments (in the score range of 400s) have been linked to the EPAS scale (ranging from 1 to 36). The concordance relationship between the EPAS scale and the ACT Aspire scale was estimated using the equipercentile method described in Kolen and Brennan, through which a particular EPAS scale score and the corresponding ACT Aspire scale score have the same percentile rank. The concordance analysis was based on the ACT Aspire 2013 special studies involving a sample of over 16,000 students (grades 7 and above) who took one of the EPAS assessments and ACT Aspire assessments in English, mathematics, reading, or science at the same grade level.

PISA is an international assessment that assesses fifteen-year-old students in reading, mathematics, and science literacy. PISA 2012 was administered to over 500,000 students in 65 countries/economies. The linking of PISA 2012 mathematics, reading, and science to PISA 2009 was “undertaken using standard common item equating methods.” Therefore the scale scores of these two cycles are comparable.
Using the 2005 ACT College Readiness Benchmarks on ACT Plan as the measure of readiness, the ACT Plan–PISA 2009 study established an empirical link between ACT Plan and the PISA assessment. The results in that study showed that the ACT standards of college readiness are internationally competitive. The current report updates ACT College Readiness Benchmarks linked to the PISA scale based on the updated 2013 ACT Plan Benchmarks. Using data from the PISA 2012 administration, the ACT College Readiness Benchmarks were reevaluated among the average performance of PISA 2012 participants.

The Updated Linkage

Table 1 presents the original 2005 and updated 2013 Benchmarks for ACT Plan. The updated Benchmarks for English and mathematics remained the same, and there was a one-point increase for reading and a one-point decrease for science. Table 2 presents the concorded ACT Aspire scale scores and the concorded PISA scale scores corresponding to the updated ACT Plan Benchmarks. For mathematics, an ACT Aspire scale score of 431 and a PISA scale score of 530 correspond to the ACT Plan College Readiness Benchmark. The ACT Plan Benchmark for reading has corresponding scale scores of 425 and 536 for ACT Aspire and PISA, respectively.

Figures 1 and 2 display the average performance in mathematics and reading, respectively, of all countries/economies participating in PISA 2012. Countries’/economies’ performance are reported in different colors depending on whether they are statistically significantly above the OECD average, not statistically different from the OECD average, or statistically significantly below the OECD average. Similar to the ACT Plan–PISA 2009 study, this report examined whether the average PISA scale score of a specific entity was statistically significantly different from the ACT College Readiness Benchmarks. The 95% confidence interval (CI) around the ACT College Readiness Benchmarks linked to the PISA scale score (i.e., mathematics 530, reading 536), and the 95% CI for the average PISA scale score of each entity were calculated. If the 95% CI around the entity mean overlaps with that of the linked PISA score, that entity is not statistically significantly different from the ACT College Readiness Benchmarks. Otherwise, it is either statistically significantly above or below the ACT performance standard. In the current investigation, of all the sixty-five participating countries/economies, five scored statistically significantly above the updated ACT College Readiness Benchmark. In addition, mean performance of fifteen-year-old students in the United States and the vast majority of other participating countries are significantly below the Benchmarks. This study will allow ACT Aspire test takers and test users to compare their performance to international performance on PISA.

Summary

This report updates earlier research in linking the ACT College Readiness Benchmarks, the ACT Aspire early high school assessments, and the PISA 2012 assessment in order to facilitate comparisons of ACT Aspire test takers with international standards and benchmarks using the updated ACT College Readiness Benchmark. Results illustrate that only a few of the highest-performing countries scored above the updated ACT College Readiness Benchmarks. In addition, mean performance of fifteen-year-old students in the United States and the vast majority of other participating countries are significantly below the Benchmarks. This study will allow ACT Aspire test takers and test users to compare their performance to international performance on PISA.

### Table 1. ACT Plan College Readiness Benchmarks

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<tr>
<th>Subject area</th>
<th>2005 (original)</th>
<th>2013 (updated)</th>
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<tr>
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<td>18</td>
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<tr>
<td>Science</td>
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### Table 2. ACT Plan College Readiness Benchmarks, Concorded ACT Aspire, and Concorded PISA Scores

<table>
<thead>
<tr>
<th>Subject area</th>
<th>ACT Plan Benchmarks</th>
<th>ACT Aspire</th>
<th>PISA</th>
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</thead>
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<tr>
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<td>430</td>
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</table>
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Significantly higher than the ACT College Readiness Benchmark

Significantly lower than the ACT College Readiness Benchmark

Figure 1. Tenth-grade college readiness performance benchmark compared to the performance of countries/economies on PISA 2012 mathematics

Note: Even though the mean score (after rounding) of Poland is below Finland, the mean score of Poland is not statistically different from the ACT College Readiness Benchmark due to large standard error.
Figure 2. Tenth-grade college readiness performance benchmark compared to the performance of countries/economies on PISA 2012 reading.
The ACT Plan–PISA 2009 study displayed figures for mathematics and reading. To conform to that study, the current report does not include figures for science.


3. Concorded PISA scale score in English is excluded from table 2 because English was not tested on PISA.


Notes

